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Research Paper

Position statement of the Interamerican Society of Cardiology (IASC) on the current guidelines for the prevention, diagnosis and treatment of arterial hypertension 2017–2020

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ABSTRACT

Objectives: As an Inter-American Society we are convinced of the need to standardize the steps in which we diagnose, evaluate, treat and control hypertension, establishing guidelines and rules that should be adopted in all countries of Latin America, aimed at standardizing management and control of CV risk in order to achieve a substantial decrease in CV events.

Methods: In the last four years important international guidelines for the diagnosis, management, treatment and control of arterial hypertension have been published. In America, mostly in mid- and low-income countries, hypertension is a major problem of public health, being the most important cardiovascular risk factor due to its great population impact. Therefore, it is crucial to dedicate all the possible efforts to increase substantially the number of hypertensive patients diagnosed in a given area, and to improve the percentage of controlled patients. This is a major necessity in order to reduce the morbidity and mortality for CVD in the Latin American region, although no guidelines takes the Latin American populations into account, and much less standardizes their diagnosis and management.

Conclusions: The Inter-American Society of Cardiology suggest the use of the blood pressure classification of the Latin American Society of Hypertension (LASH) and recommends the use of the SCORE System to stratify the global CV risk because this system has the capability to adapt the global risk by means of a correcting factor based on the ethnicity of the different native populations in America.

1. Introduction

In the last four years five important guidelines on hypertension have been published: The Guidelines on the management of arterial hypertension and related comorbidities in Latin America [1]; the 2017ACC/AHA/AAPA/ABC/ACPMAGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [2]; the Hypertension Canada's 2018 Guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of Hypertension in Adults and Children [3]; the 2018 ESC/ESH Guidelines for the management of arterial hypertension [4]; and the International Society of Hypertension global hypertension practice guidelines [5].

The first guideline published in relation to this topic was in 1977 and after 41 years, the diagnosis, management, and control of hypertensive disease still remains a challenge around the world. This problem is particularly evident in low economic income regions, mainly due to the low availability of diagnostic methods, and the low accessibility to pharmacological treatment. This is the case in the Latin American

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Table 1
Classification in categories based on office of blood pressure and definitions of hypertension grades.

Classification of the arterial blood pressure	LASH [1]		SC/ESH [4]		AHA/ACC [2]		CANADIAN [3]	ISH [5]	
	Systolic	Diastolic	Systolic	Diastolic	Systolic	Diastolic		Systolic	Diastolic
Normal/Optimal	<120	<80	<120	<80	<120	<80			
Normal/Elevated	120–129	80–84	120–129	80–84	120–129	<80		<130	<85
High Normal	130–139	85–89	130–139	85–89				130–139	85–89
Grade 1	140–159	90–99	140–159	90–99	130–139	80–89	≥140/≥90	140–159	90–99
Stage 1									
Grade 2	160–179	100–109	160–179	100–109	>140	>90		≥160	≥100
Stage 2									
Grade 3	≥180	≥110	≥180	≥100					
Hypertensive crisis					>180	>120			
Isolated systolic hypertension	≥140	<90	≥140	<90				≥140	<90

LASH: Latin America Society of Hypertension, ACC: American College of Cardiology, AHA: American Heart Association, ESC: European Society of Cardiology, ESH: European Society of Hypertension, ISH: International Society of Hypertension.

countries independently of their level of development. The consequence is the very low control of high blood pressure (HBP) which does not manage to surpass more than 10% of control rates in many of these countries [6].

Hypertension is an important global health challenge its high prevalence and its impact on cerebral, cardiovascular and renal damage, still being the leading preventable risk factor for premature death and disability worldwide. National reports have indicated that the prevalence of hypertension is increasing in low- and middle-income countries and its burden may be summarized as follows [6,7]:

1. Globally, 31.1% of the adult population (1.39 billion people) have hypertension.
2. Hypertension prevalence is higher in low- and middle-income countries (31.5%) than in high-income countries (28.5%).
3. Approximately 75% of people with hypertension (1.04 billion) live in low- and middle-income countries.
4. Hypertension awareness, treatment, and control are much lower in low and middle-income than in high-income countries.

The recent US, Canadian, European and International hypertension guidelines may have a very large impact on Latin American physicians, although probably not uniform due to the lack of consensus on which guide to apply in these countries, and because important differences in health care conditions can be expected even within the same country [8]. If the new thresholds to define and classify hypertension proposed by the 2017 AHA/ACC guidelines were adopted, this would increase the prevalence of hypertension in the US by 14%, with 46% of this population becoming "hypertensive" [9]. These implications are particularly important when considering countries having a higher prevalence of hypertension with the classical definition, prevalence that would dramatically increase with the new definition. Such important increment in hypertension prevalence would have a significant economic impact, given that an increase in the number of patients diagnosed as hypertensive unavoidably means an increase in health care costs related to treatment of much more individuals. Only if this more aggressive approach results in a significant reduction in the incidence of stroke, acute myocardial infarction (MI), heart failure (HF), chronic end-stage kidney disease (CKD) and mortality, these costs would be justified, otherwise the new classification would lead to a huge increment in the health care cost/benefit ratio.

Not surprisingly, at variance from US guidelines [2], the Canadian [3], European [4] and International [5] guidelines maintain the same definition as in previous years, based on the consideration that there is no enough robust evidence to modify the arbitrary cut-off point for diagnosing hypertension currently set at a BP level of ≥140/90 mmHg.

The Latin American guidelines, prepared to fit the needs of countries in Central and South America, are still far not only from being applied, but even from being known by most Latin American physicians. The knowledge and implementation of the Guidelines are one of the biggest challenges for Latin American Hypertension Societies, called to disseminate, test and reformulate the available recommendations based on local needs and experience, with the aim of making them better applicable in different Latin American populations. The main purpose of this document is to analyze the five guidelines mentioned above, trying to derive from them uniform recommendations that might be applicable in Latin America.

2. Methodology

The task force in charge of preparing this paper identified a number of sequential steps to be follow in analyzing the content of the four available guidelines.

1. Identify the special characteristics of each particular guide.
2. Search and analyze the target values proposed for different categories of patients.
3. Search and analyze the cardiovascular risk assessment methods used.
4. Identify controversial elements.
5. Evaluate the diagnostic value given to out-of-office BP (Ambulatory blood pressure monitoring [ABPM], home blood pressure monitoring [HBPM]) and the importance given to hypertension mediated organ damage (HMOD) assessment (echocardiogram [ECHO], albuminuria, ECG, Carotid IMT, etc.)
6. Analyze the therapeutic recommendations.
7. Define the IASC Position in relation to the diagnosis, treatment and control of arterial hypertension.
8. Suggest the appropriate recommendations.

3. Classification of arterial hypertension

Based on the five guidelines published since 2017 the Task Force proposes to maintain the classical classification of hypertension based on the cut-off office BP values of ≥140/90 mmHg, as adopted by the 2017 LASH [1], the 2018 ESC/ESH guidelines [4] and the 2020 ISH guidelines [5]. (Table 1).

3.1. Diagnosis of hypertension

3.1.1. Office blood pressure measurement

All guidelines agree that repeated office BP measurements following a very similar strict protocol, have to be used to define hypertension.

3.1.2. Out-of-office blood pressure measurement

Out-of-office BP measurement refers to the use of either home BP monitoring (HBPM) or ambulatory BP monitoring (ABPM), the latter usually over 24 h. It provides a larger number of BP measurements than conventional office BP in conditions that are more representative of daily life [4,5].

HBPM should be considered as the average of all BP readings

Table 2
Definition of hypertension according to home (HBPM) or ambulatory blood pressure Monitoring (ABPM) measurements.

	2017 LASH [1]	2017 ACC/AHA [2]	2018 ESC/ESH [4] and 2020 ISH [5]	2018 Canadian [3]
HBPM	SBP ≥ 135 and/or DBP ≥ 85 mmHg	SBP ≥ 130 and/or DBP ≥ 80 mmHg	SBP ≥ 135 and/or DBP ≥ 85 mmHg	
ABPM				
Day-time mean	SBP ≥ 135 and/or DBP ≥ 85 mmHg	SBP ≥ 130 and/or DBP ≥ 80 mmHg	SBP ≥ 135 and/or DBP ≥ 85 mmHg	SBP ≥ 135 and/or DBP ≥ 85 mmHg
Night-time mean	SBP ≥ 120 and/or DBP ≥ 70 mmHg	SBP ≥ 110 and/or DBP ≥ 65 mmHg	SBP ≥ 120 and/or DBP ≥ 70 mmHg	
24hs mean	SBP ≥ 130 and/or DBP ≥ 80 mmHg	SBP ≥ 125 and/or DBP ≥ 75 mmHg	SBP ≥ 130and/or DBP ≥ 80 mmHg	SBP ≥ 130 and/or DBP≥80 mmHg

LASH: Latin American Society of Hypertension; ACC/AHA: American College of Cardiology/American Heart Association; ESC/ESH: European Society of Cardiology/European Society of Hypertension; ISH: International Society of Hypertension.

performed with a semiautomatic validated BP monitor for at least 3 days, and preferably for 6–7 consecutive days before each clinic visit. Readings should be obtained in the morning and the evening after 5 min of rest, with the patients seated and their back and arm supported. Two measurements should be taken at each measurement session, performed 1–2 min apart [4,5].

ABPM provides the average of BP readings over a defined period, usually 24 h. The device is typically programmed to record BP at 15–30 min intervals, and average BP values are usually provided for daytime, nighttime, and 24 h. A minimum of 70% valid BP recordings are required for a valid ABPM measurement session [4,5].

All these guidelines match on four important points. First conventional office BP measurements have great variability, may induce diagnosis misinterpretation and are not able to identify masked and white coat hypertension [10,11] Second, HBPM and ABPM are complementary diagnostic tools very useful in the detection of hypertension and cardiovascular risk prediction in hypertensive patients [12,13]. Third, we should consider HBPM, with or without telemonitoring of self-measured BP values, as a cheaper option than ABPM and also as a useful tool to increase treatment adherence and BP control, a feature which is particularly important in the low or medium incoming countries of Left Atrial (LA) [13,14]. Fourth, all these guidelines consider in using HBPM or ABPM as much as possible in the diagnosis and follow up of hypertension. The 2018 ESC/ESH hypertension guidelines indicated for the first time to base and confirm the diagnosis on HBPM or ABPM [4] what is maintained in the more recent ISH hypertension guidelines [5]. Table 2 shows the cut-off values for HBPM or ABPM to define hypertension.

4. Central aortic pressure and pulse wave velocity (PWV)

There is also an agreement in the guidelines that an incremental prognostic value of central aortic pressure over conventional office BP remains unclear, and this is the reason for which it is not universally recommended [1–5] Another important point is that the reference values have been obtained from the European population [15] but we do not have tested the corresponding central BP and PWV reference values for LA populations, which need to be identified. PWV is considered an important biomarker to stratify the CV risk, mainly in low and moderate risk individuals and there is a wide agreement about the fact that PWV has high sensitivity to detect vascular changes induced by pharmacological treatment [16,17]. Nevertheless, PWV is not considered a therapeutic target in any guidelines.

5. Electrocardiogram (ECG)

All the guidelines agree that the ECG is the standard method to detect arrhythmias and for the initial diagnosis of left ventricular hypertrophy (LVH), followed by an echocardiogram whenever possible [1–5]. The LASH guidelines [1] established that the ECG is basic to evaluate hypertensive patients, while the ESC/ESH guidelines [4] and the ISH guidelines [5] recommend the ECG as a routine test, which should be part of the evaluation and follow up of all hypertensive subjects. We recommend the use of the most common criteria used to define LVH by the ECG, like Cornell Criterion or Sokolow-Lyon Criterion [1,4,5].

However, despite this endorsement by scientific societies, the ECG is a method with recognized limitations when the aim is to diagnose the presence of LVH, since its sensitivity does not exceed 40% in most published series, and its positive predictive value as well as the likelihood for a positive result to detect hypertension mediated organ damage (HMOD), are also low[1–5].

6. Echocardiogram (ECHO)

The diagnosis of LVH by ECHO is one of the markers of HMOD, cardiovascular risk and prognosis in hypertensive patients. Therefore, in all centers where the initial evaluation of the patient with hypertension is possible, ECHO is recommended for an accurate diagnosis of LVH and diastolic function.

Two-dimensional transthoracic echocardiography (ET2D) allows the assessment of the clinical impact of hypertension on the heart, by quantifying left ventricular mass (LVM) and the different geometric patterns of the left ventricle. Classically, geometric patterns are classified as normal geometry, concentric remodeling, concentric hypertrophy and eccentric hypertrophy, with the additional possibility to evaluate systolic and diastolic left ventricle function and left atrial (LA) size [18,19,20].

LVH is a powerful prognostic predictor of mortality [16] and its regression by treatment predicts a better prognosis [21]. Evaluation by ET2D allows the assessment of ventricular function (systolic and diastolic), LA volume and dimensions of the aortic root. However, it is yet to be accepted weather the evaluation of other parameters different from the increase of the LVM and LA dilatation can be useful for stratifying cardiovascular risk in hypertension [22]. Also diastolic function has a prognostic importance, and for this reason it must be reported in all ECHO reports of a hypertensive patient [23].

Alterations of the LV geometry in hypertensive patients are frequently associated with some degree of diastolic dysfunction [23,24] which is usually evaluated by means of ET2D, with the measurement of transmitral flow velocity (E wave velocity of mitral flow) and the diastolic velocities (e') at the level of the mitral annulus (lateral and septal) using tissue doppler imaging. The E/A ratio of the mitral flow, the E/e' ratio, the degree of dilatation of the LA, and the level of pulmonary systolic pressure give an approximate idea of the degree of diastolic dysfunction [25]. In hypertensive patients, diastolic dysfunction and dilatation of the LA have prognostic implications [26,27]. Moreover, in the diagnostic evaluation of secondary hypertension, the suprasternal window is useful to rule out coarctation of the aorta [28].

7. Cardiac imaging

Cardiac magnetic resonance (CMR) is the best tool for the quantification of LVM, volumes and ejection fraction (EF) [23]. When compared to CMR, three-dimensional transthoracic echocardiography (ET3D) has shown greater accuracy than ET2D, in terms of the quantification of LVM, volumes and EF [24]. However, 3D echocardiography has much fewer prognostic validation studies than its 2D counterpart [23,24] and is not available in all centers.

7.1. Quantification of calcium score in the hypertensive patient

The quantification of calcium in the coronary artery (CCA), assessed through a cardiac computed tomography (CCT), measured by the method of "Agatston" (Quantification of Agatston), and expressed in Agatston Units (AU), is a powerful subclinical marker of absolute risk for cardiovascular atherosclerotic disease (CVAD), and adds additional prognostic value to the traditional risk estimation derived from risk factors.

We consider that CCA is indicated for prognostic stratification in an asymptomatic patient with low to intermediate pre-test risk for CAD; or in a symptomatic patient with other added risk factors (intermediate risk), as a noninvasive diagnostic technique for detecting obstructive CAD, particularly with a previous stress test inconclusive or not valuable (Primary prevention) [28–32].

8. Cardiovascular risk assessment

The determination of global cardiovascular risk is a mandatory step in the initial evaluation of all hypertensive patients. Hypertension is quantitatively the most important risk factor for premature cardiovascular death and it accounts for an estimated 54% of all strokes and 47% of all ischemic heart disease events globally [33,34]. Elevated BP was the leading global contributor to premature death and disability in 2015, which have increased by 40% since 1990 [35].

Hypertension increases the risk for a variety of cardiovascular diseases (CVD), including stroke, CAD, HF, atrial fibrillation (AF), peripheral vascular disease and CKD [36]. The risk for both CAD and stroke increases with increase in BP has been shown in many epidemiologic studies. Furthermore, evidence is emerging that links early BP elevations with increased risk of cognitive decline and dementia [37,38].

Hypertension rarely occurs as a single risk factor, and often is associated with other CV risk factors such as dyslipidemia, visceral obesity and glucose intolerance [39]. This clustering of metabolic risk factors has a multiplicative effect on cardiovascular risk [40]. The likelihood of a person developing a CV event over a given time period is a very important part of the risk stratification process for patients with hypertension. CV risk prediction models are used in clinical practice to identify high-risk populations. There are many available CV risk assessment systems (Framingham Risk Score, the Systematic Coronary Risk Evaluation), and most focus on a 10-year risk. However, not all CV risk prediction models can accurately identify high risk individuals.

We recommend use the Systematic COronary Evaluation (SCORE) System, because it is based on large, representative European cohort data set, operates with hard reproducible endpoints (CV death), risk of CAD and stroke can be derived separately, and enables the development of an electronic, interactive version of the risk chart. In addition, there is a validated version of the SCORE chart in Spanish language than can be used by all Latin American physicians. The SCORE risk function can be calibrated to each country national mortality statistics. The SCORE System estimates the 10-year risk of a first fatal atherosclerotic event in relation to age, smoking, total cholesterol level, and systolic BP [41]. Although the calculation of the SCORE risk is for European Caucasian population it may be adapted using a correcting factor for different ethnicities, being 0.9 for the North America natives (less risk), 0.7 for the different South America original populations (less risk), and 1.3 for the Caribbean area populations (increased risk) thus allowing a CV risk assessment with greater accuracy [42].

There are various factors that influence and modify the CV risk in patients with hypertension, such as those with documented clinical CVD, including asymptomatic atheromatous disease on imaging, type 1 or type 2 diabetes, very high levels of individual risk, grade III of Hypertension, or CKD. These patients are automatically considered to be at very high (≥10% CVD mortality) or high risk (5–10% CVD mortality) [4]. Cardiovascular risk evaluation should be complemented by assessment of HMOD, which can increase CV risk to a higher level, even in asymptomatic patients, and is a very important aspect of CV risk estimation [4,5].

Table 3
Recommended strategy to start pharmacological therapy.

Grade 1 With low cardiovascular risk
Start with monotherapy or low-dose single pill combination therapy ACEI, or ARBs, or CCB or Diuretic (Thiazide, chlorthalidone, Indapamide), Combination therapy: can also be considered in the first prescription line
Grade 2 With any level of Cardiovascular Risk
Start with single pill combination at standard doses of: ARB or ACEI + CCB or diuretic If necessary ARB or ACEI + CCB + diuretic
Grade 3 With moderate or high cardiovascular risk
Start with single pill combination at standard dose of: ACEI or ARB + CCB or Diuretic (thiazide, chlorthalidone, Indapamide) If necessary triple combination ARB or ACEI + CCB + diuretic in a single pill Polypill use in special indications (secondary prevention)

Angiotensin converting enzyme inhibitors (ACEIs), Angiotensin receptor blockers (ARBs), Calcium Chanel Blockers (CCB).

There is emerging evidence that an increase in serum uric acid level is independently associated with increase CV risk and its measurement is recommended as part of the screening of hypertension [43] and can contribute to estimate CV risk in hypertensive patients, especially for those at moderate-risk (10-year Score ≤1–5%) in whom an additional risk factor might convert moderate–risk to high risk and might modify treatment decision.

The SCORE system only estimates the risk of fatal CV events and the risk of total CV events (fatal and non-fatal) is approximately three times higher than fatal CV events in men and four times in women. However, this decreases less than three times in the elderly in whom a first event is more likely to be fatal [44].

9. Hypertension treatment

9.1. Non-pharmacological treatment

Epidemiological studies have shown a strong association between sedentary lifestyles and cardiovascular risk factors, including obesity, diabetes and hypertension as well as an association between physical inactivity with cardiovascular disease and mortality from all causes [45].

The Prospective Urban Rural Epidemiology PURE study that evaluates the effect of physical activity on mortality and cardiovascular disease in 130,000 people without cardiovascular disease, showed a reduction in the relative risk of 86% among the groups of moderate physical activity compared to the group of low physical activity to develop arterial hypertension [46]. In addition to the PURE study, other studies have shown that in adults aerobic physical activity reduces systolic BP on average between 2 and 5 mmHg and diastolic BP between 1 and 4 mmHg [1,46]. Regular aerobic exercise of at least 30 min per day is recommended in five to seven days per week [4,5,47]. Control of body weight is another effective non-pharmacological management strategy to improve hypertension control [4,5,47].

There is evidence of a strong association between sodium intake and systolic BP; however, this association was found in communities that consumed more than 5 g per day. The relationship between sodium intake and CV events adopts a "J" curve, since an assumption of less than 3 g per day increases the incidence of CVD [1]. Additionally, an increase in the consumption of potassium, vegetables, fresh fruits, fish and unsaturated fatty acids is recommended [2,4,5,47].

It is also recommended to stop smoking and limiting the consumption of alcoholic beverages to less than 14 units per week in men and less than 8 units per week in women [4,5].

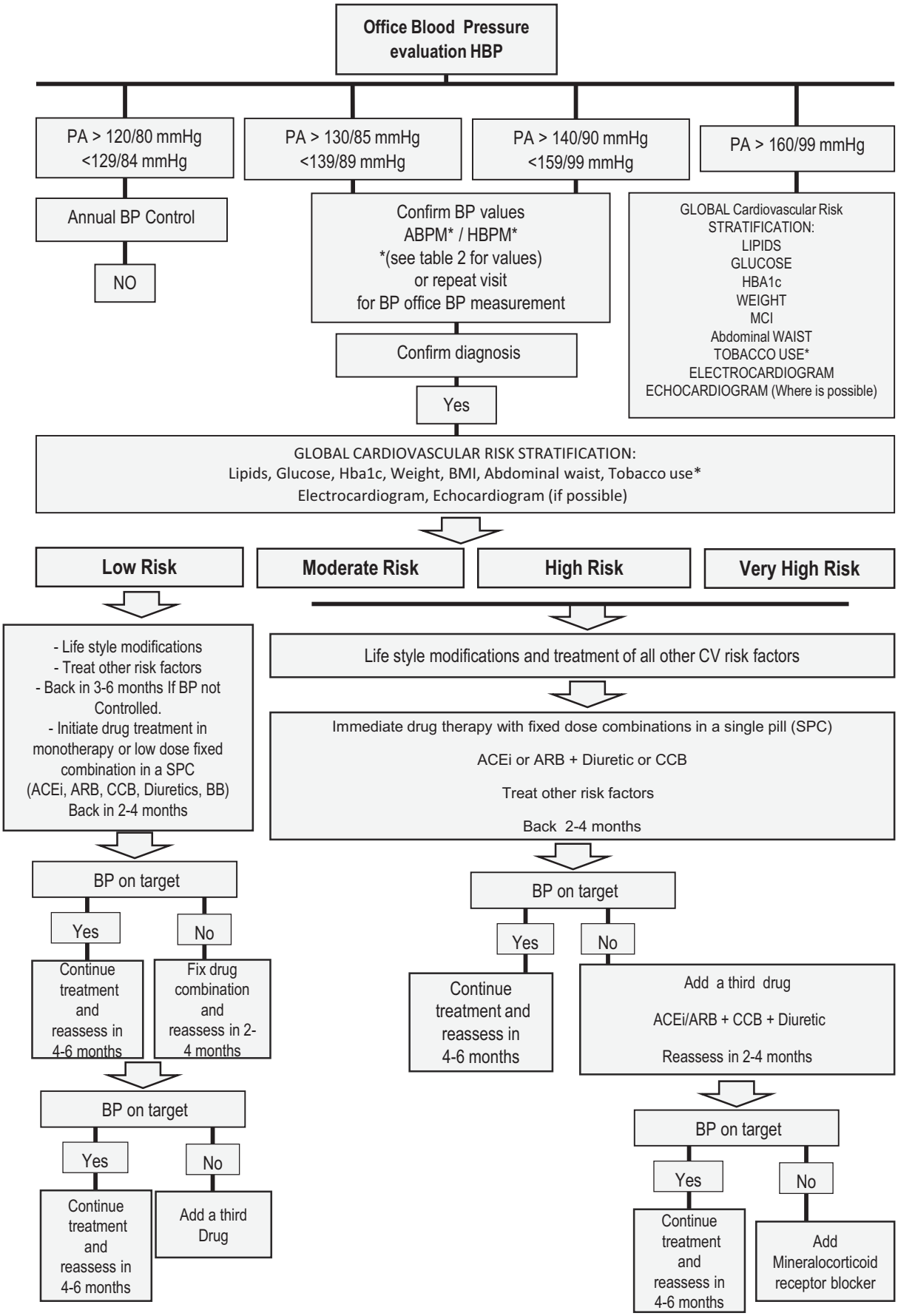

Fig. 1. Proposal by the Inter American Society of Cardiology for the diagnosis and treatment of hypertension in Latin American Countries.

9.2. Pharmacological treatment

A recent meta-analysis that included 247,000 patients [48] concluded that there are very small differences between the different groups of antihypertensive drugs in their capacity of CV event reduction and that the effects of the different classes on composite goals are quite similar. Therefore, antihypertensive treatment can be based on any of the five main classes of drugs that have been widely used in comparative studies against placebo and in comparative head-to-head studies. All these drugs are suitable for initiating and maintaining antihypertensive treatment in monotherapy or in combination [4,5,49,50]. However, there are special indications for which some drug classes are privileged over others, such as the case of the renin angiotensin aldosterone system (RASS) blockade in diabetics and betablockers in coronary disease.

Regarding betablockers, it is important to mention that they are not a uniform therapeutic class and that there is evidence favoring the use of the new generation betablockers like bisoprolol, carvedilol and nevibolol [49,50].

Table 3 summarizes the recommended strategy to initiate pharmacological treatment. Treatment should start using a dual combination therapy in a single pill (SPC) to improve adherence in the majority of patients, because this strategy permits an earlier achievement of BP targets and an improvement of hypertension control rate. The recommended drug combinations are RAAS blockers + calcium channel blockers (CCB) or diuretics, adding a diuretic or a CCB as a third drug in cases not controlled with two drugs. In patients with true resistant hypertension a further addition of a mineralocorticoid receptor blocker such as spironolactone is recommended [49,50].

Fig. 1 summarizes our proposal for the diagnosis and treatment of hypertension in Latin American Countries. To achieve this goal, it is important to disseminate and implement in all our countries those hypertension guidelines specifically designed or adapted to the heterogeneous population of Latin America. This will improve the standard clinical task of our physicians and will contribute to the reduction of the burden of cardiovascular disease morbidity and mortality in this particular geographic area. It is crucial for our future that the Latin American Scientific Societies devoted to CV disease management promote, stimulate and endorse epidemiological and clinical studies designed to known much better the real situation of all CV risk factors and their consequences in our region.

10. Conclusions and recommendations

In America, mostly in mid- and low-income countries, hypertension is a major problem of public health, being the most important cardiovascular risk factor due to its great population impact. For this reason, it is crucial to dedicate all the possible efforts, both economic and educational, to increase substantially the number of hypertensive patients diagnosed in a given area, and to improve significantly the percentage of controlled patients. This is a major necessity in order to reduce the morbidity and mortality for CVD in the Latin American region. As an Inter-American Society, we are convinced of the need to standardize the steps in which we diagnose, evaluate, treat and control hypertension, establishing guidelines and rules that should be adopted in all countries of Latin America speaking the same language, aimed at standardizing management and control of CV risk in order to achieve a substantial decrease in CV events. The Inter-American Society of Cardiology suggests for Latin America the use of the BP classification of the Latin American Society of Hypertension (LASH) [1], the same used by the ESC/ESH [4] and the ISH [5] because is adapted to our region.

We recommend the use of the SCORE System to stratify the global CV risk because it has the capability to adapt the risk by means of a correcting factor based on the ethnicity of the different American native populations, increased or decreased with respect to the European Caucasians, being 0.9 for the North America natives, 0.7 for the different South American original populations and 1.3 for the Caribbean area [4].

Declaration of competing interest

None of the authors declare any conflicts of interest.

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